Large-scale active slump of the southeastern flank of Pico Island, Azores

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We were interested to read the paper by Hildenbrand et al. (2012) outlining geodetic and geologic evidence for active movement of a giant slump in Pico Island, Azores. Such movement is potentially a concern to local communities, so the issues arising from the paper need addressing. We wish to correct two inaccuracies related to our work, which are relevant to the assessment. First, in Mitchell et al. (2012) we did not claim that the movement involved “vertical caldera collapse.” Rather, we had explored whether or not that had occurred, in order to attempt to explain away the lack of benches in the offshore slope of the island that would normally be expected from the toes of active slumps. We judged that option unlikely. Second, although a debris field was interpreted from sidescan sonar data in Mitchell (2003), multibeam sonar data collected in 2003 failed to show such a feature; indeed, the general profile of the island here is more like the constructional cliffs of ocean islands (Mitchell et al., 2002, 2008). A debris-flow–type movement (using terminology of Moore et al. [1989]), in contrast, commonly leaves a smoothly varying lower-gradient exponential slope profile (Mitchell et al., 2002). To reconcile the 2003 multibeam with the sidescan sonar data, we had suggested that earlier emplaced debris might have become covered by sediment to reduce its relief, while shallowly buried traces were still imaged by the low-frequency (6.5 kHz) sidescan sonar. The steep submarine slope of the island, we argued, could have become covered by sediment to reduce its relief, while the option of subsidence related to compaction of the lava delta here should not be ruled out at this stage of investigation.

For the many collapses of volcanic islands that have occurred in the geological past, unfortunately, researchers are largely able only to suggest mechanisms based on circumstantial evidence because the conditions at the time of failure are poorly known. The wide range of suggested causes of failure (Keating and McGuire, 2000) largely reflects this lack of knowledge. South Pico is one of only a few sites of active movement in volcanic islands, so it is important to glean as much from it as we can. We strongly urge the installation of a micro-seismic network and array of continuously recording GPS instruments, which have been useful elsewhere in detecting volcanic slump movements linked to intense rainfall (Cervelli et al., 2002). Such measurements have the potential to resolve this local issue, provide data of wider utility to understanding the threats to volcanic islands from failure, and help to reassure the local population.

REFERENCES CITED


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